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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,771	12/08/2003	Minh Q. Tran	50432-590	1076

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EXAMINER

PERT, EVAN T

ART UNIT PAPER NUMBER

2826

DATE MAILED: 04/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/728,771

Applicant(s)

TRAN, MINH Q.

Examiner

Evan Pert

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 December 2003.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-18 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 27 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 1203.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to because Fig. 1 shows the numeral "11" delineating what is understood to be a prior art "barrier" layer. To overcome the objection, applicant could amend the specification at p. 3, line 3, after "dielectric layer 10," by inserting: --with barrier layer 11 in the opening,--. Correction is required.

### *Specification*

2. The disclosure is objected to because of the following informalities:

At p. 1, last line of [03], "geometry shrink" should read --geometry shrinks-- or ---geometries shrink--.

At p. 6, line 2 of [22], "is resistivity" should read --in resistivity--.

At p. 6, line 4 of [23], "as at an" should read --such as at an--.

At p. 6, line 6 of [23], "opening of" should read --opening is of--.

At p. 10, line 3 of [40], "palting" should read --plating--.

Correction is required.

Furthermore, at p. 6, last line of [24], "13 Å to 36 Å to an annealed value of 19 Å to 25 Å" seems to include a typographical error since an Ra of "19 Å" is a greater surface roughness than an Ra of "13 Å". Explanation and/or correction are required.

Appropriate correction is required.

***Claim Objections***

3. Claims 11 and 14 are objected to because "layer tantalum nitride" in line 2 of claim 11 should read --tantalum nitride layer--, to be consistent with the four words ending the claim, and in claim 14 "formed dielectric" should read --formed in dielectric--.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-18 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete in the process order of steps claimed. It is essential that the act of "filling the opening with Cu or Cu alloy" be performed after the "thermal annealing the seed layer enhancement film," which not apparent from the claim.

Applicant's invention is drawn to annealing a seed enhancement layer prior to filling an opening with Cu or Cu alloy, such as described at [21]. In the prior art, annealing is performed and an enhancement seed layer is deposited, wherein the seed layer, the enhancement film and filled opening are all annealed, as indicated by any of US 20030159921A, US 20030066752A1, US 20030020928A1, or US006428673B1, for example.

Applicant's invention is not about annealing a seed enhancement layer consequentially, and after a filling of the opening in which the enhancement layer was formed. Applicant's invention includes an essential step of annealing the seed enhancement layer after the enhancement layer is deposited on the seed layer, but before the opening is filled, which is not recited clearly in the independent claim 1.

In order to overcome this rejection, applicant is required to clarify the claimed process order, such as by amending claim 1 at the last line to insert --after said thermal annealing the seed layer enhancement film--. Correction is required.

### ***Double Patenting***

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. At the time of applicant's invention, US 6,506,668 was assigned to Advanced Micro Devices, Inc., which was a common assignee of the instant invention:

Therefore, claims 1-18 are merely rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-19 of U.S.

Patent No. 6,506,668.

Although the conflicting claims are not identical, they are not patentably distinct from each other because limitations not found in the pending claims are obvious additions to the patented claims, in view of well-known prior art [Official Notice]:

For example, in pending claim 1, the only element not anticipated by patented claim 1 is the "opening" in the "dielectric," which is admitted prior art anyway [Fig. 1] and which is an obvious practice, to make a copper via, for example.

With respect to claim 1, for example, it would have been obvious to apply the invention of Woo et al. to improve a prior art "via" in a "dielectric," as is suggested by the words "barrier" and "seed" and "forming interconnects" in claim 1.

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 2002/0008036 A1 is cited for particular relevance of [0006] where the prior art problems with seed layers for copper are summarized.

US 20030159921A, US 20030066752A1, US 20030020928A1, and US006428673B1 are cited for discussing equipment and processes using the equipment where there is "seed layer enhancement" and "annealing" and/or "baking." In these references there is an annealing after electroplating on a seed layer that has been subjected to seed layer enhancement.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evan Pert whose telephone number is 571-272-1969. The examiner can normally be reached on M-F (7:30AM-3:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ETP  
April 1, 2005

  
**EVAN PERT**  
**PRIMARY EXAMINER**